CLAIMS

1. An energy storage device comprising a series network of n storage elements ($C_1,\ldots,C_8$) able to provide a continuous voltage across its terminals, and a plurality of charge transfer modules, each module ensuring a bidirectional transfer of charge between two storage elements of said network, characterized in that it comprises n(n-1)/2 identical modules, each storage element (C_k) being paired with each of the other n-1 storage elements of the network by (n-1) associated modules ($M_{k,1}$, $M_{k,2}$ … $M_{k,k-1}$, $M_{k,k+1}$ … $M_{k,n-1}$, $M_{k,n}$).

2. The device as claimed in claim 1, characterized in that said modules are of the three-pole or four-pole type depending on whether the elements that they pair are adjacent or nonadjacent.

3. An energy storage device comprising a series network of n storage elements ($C_1,\ldots,C_8$) able to provide a continuous voltage across its terminals, and a plurality of charge transfer modules, each module ensuring a bidirectional transfer of charge between two storage elements of the said network, and in which $n=2^m$, characterized in that it comprises n-1 modules of three-pole type, distributed as m-1 groups of rank 0 to m-1, such that to the group of rank i there corresponds 2^i modules ($M1_0$, $M1_1$), each associated with $n/2^i$ elements arranged as two assemblies so as to form a pair, the modules of the said group of rank $i \neq 0$ being dimensioned so as to have a gain in current 2^i times as large as the gain in current of the module (M0) of the group of rank 0.

4. An energy storage device comprising a series network of n storage elements ($C_1,\ldots,C_8$) able to provide a continuous voltage across its terminals, and a plurality of charge transfer modules, each module ensuring a bidirectional transfer of charge between two storage elements of the said network, and in which $n=2^m$-x, characterized in that it comprises a number I of modules of three-pole type, with $n-1-x<I\leq n-1$ modules, distributed as m-1 groups of rank 0 to m-1, such that to the group of rank i there corresponds at

most 2^i modules ($M1_0$, $M1_1$), each associated with $n/2^i$ elements arranged as two assemblies so as to form a pair, the modules of the said group of rank $i \neq 0$ being dimensioned so as to have a gain in current 2^i times as large as the gain in current of the module (M0) of the group of rank 0.

5. The device as claimed in any one of claims 1 to 4, characterized in that the charge transfer between the said element and the p elements which are paired with it manifests itself by a charging or discharging current of these paired elements proportional to first order to the difference between the voltage at the terminals of the said element and the average of the voltages at the terminals of the said p charge elements paired with the said element.

6. The device as claimed in any one of claims 1 to 5, characterized in that the said storage elements are electrochemical battery cells.

7. The device as claimed in any one of claims 1 to 5, characterized in that the said storage elements are cells of lithium-ion battery type.

8. The device as claimed in any one of claims 1 to 5, characterized in that the said storage elements are supercapacitors.

9. An electronic system comprising a charger and an energy storage device as claimed in any one of the preceding claims, rechargeable by the said charger.